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Extension Sustainability Camp: Design, Implementation, and Evaluation

Abstract

Sustainability Camps provide an opportunity for Extension educators to be in the forefront of sustainability outreach and to meet the growing demand for sustainability education. This article shares development, implementation, and evaluation of an Extension Sustainability Camp for youth, grades 4-6. Camp impact was measured via daily pre- and post-journaling activities, changes in camper lunch waste produced, and a retrospective post-then-pre household evaluation follow-up. Significant awareness and behavioral changes were documented with sustainability topics ranging from land conservation to renewable energy. The camp structure and evaluation design could serve as a model for Extension educators interested in sustainability outreach.

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Introduction

Demand for sustainability-related information and outreach has seen a recent dramatic increase. According to The Princeton Review's (2012) nationwide study with over 10,000 college applicants, 65% of respondents said they would value information about a college's commitment to the environment. Of that, 24% said such information would either "strongly" or "very much" impact their application decision. Sustainability has become a focal area and marketing opportunity for thousands of businesses, colleges, and universities across the United States. In 2009, U.S. colleges and universities created over 100 majors, minors, and certificates in energy and sustainability-related programs. Only three programs were added in 2005 (Schmit, 2009).

Extension has been slow to respond to this growing demand, however. As mentioned by Elliot et al. (2008),

> To effectively address the need for Sustainable Living Education, Extension must immediately re-focus and re-tool. We need a state-by-state implementation of sustainable living programming to help clientele break from excessive consumption patterns held up as societal

> norms...if Extension is not prepared to be a leader in providing education on this overriding challenge of our time, the public will go elsewhere for it—and indeed, the public is already doing so.

Those most in need of—and likely to experience a lasting impact in—sustainability outreach are youth (Chawla, 1998; Schusler, Krasny, Peters, & Decker, 2009). This article guides readers through designing, implementing, and evaluating a 5-day environmental sustainability Extension camp for youth. Major sustainability topics, activities, and required tools are covered. Also, readers will discover techniques for journaling activities to measure increased awareness in youth and household follow-up evaluation tools to measure whether the child's participation in a Sustainability Camp results in sustainability changes at the household level.

Literature Review

Sustainability in Extension

In Sustainable Living Education: A Call to Extension, the authors list six essential action items Extension should engage in regarding sustainable living education (Elliot et al., 2008). These include the need to be multidisciplinary; to holistically address our energy, water, and carbon footprint; to occur now; to focus on how our choices and behaviors affect natural resources; for Extension faculty and staff to serve as sustainable living role models; and to foster individual, family and community-level change. This call fostered the idea to design youth Extension Sustainability Camps.

Sustainability programs in Extension are seeing recent growth. Newer programs helped frame major camp themes. These sustainability programs focus on renewable energy (e.g., Montana State University's Exploring Energy Efficiency and Alternatives program, University of Wyoming's Extension Energy program, Colorado State University's Energy Master's program), water conservation (e.g., Utah State University's Utah Water Watch Extension program, eXtension.org's Water Conservation for Lawn and Landscape resource area), climate change (e.g., University of Maine's Extension Phenology program, University of Minnesota's Climate and Weather Education program), sustainable food systems (e.g., New Mexico State University's Sustainable Agriculture program, Iowa State University's Sustainable Agriculture Extension program), and sustainable living and sustainable communities (e.g., University of Florida's Sustainable Floridians and Living Green programs, Utah Sate University's Extension Sustainability initiative).

Need

The Sustainability Camp was created collaboratively between a local nonprofit, a county Extension office, and a state sustainability specialist. A need was voiced in two counties to design a sustainability-based camp educating youth about sustainable living given Utah's severe particulate matter pollution, projected population growth, water conservation issues, and fossil-fuel dependency.

During winter months, a strong inversion combined with automobile use and large numbers of cattle place several counties in Utah in consistent violation of the 24-hour average U.S. EPA National Ambient Air Quality Standards for particulate matter 2.5 (Malek, Davis, Martin, & Silva, 2006). This

results in designation of non-attainment by the Clean Air Act. An increasing population exacerbates these issues. According to the US Census Bureau, Utah's population is projected to more than double in the next 50 years, increasing from 2.8 million in 2011 to almost 6 million by 2060 (Governor's Office of Management and Budget, 2012). Utah is also the second driest state with the second highest water usage. Utah Division of Water Resources reported that Utahns consume about 260 gallons per person per day (2013), demonstrating a need for education about water conservation. Last, according to the Utah Department of Natural Resources, approximately 81% of the electricity generated in Utah is from coal-burning power plants (2011). Thus, the Sustainability Camp was designed in Utah to help address these issues, as well as address the calls for sustainability outreach in Extension and to provide positive cognitive development by allowing youth to interact with nature.

Methods

Camp Structure

The goal for the Sustainability Camp was to foster awareness and behavior change via activities and reflection in the five major areas of environmental sustainability: land, air, food, water, and energy. This goal was achieved via daily objectives in each of the five thematic days. Overall camp objectives were to help youth:

- Discuss and reflect on key sustainability concepts;
- Engage in daily activities that improve the natural environment; and
- Learn daily actions extending beyond the camp that lessen their impact on our environment and conserve resources.

The Sustainability Camp was conducted at two separate locations during summer 2013. One camp was held at Swaner Preserve and EcoCenter, a 1,200-acre nature preserve and education center located in Park City, Utah owned by Utah State University. The second camp was held at Stokes Nature Center, a non-profit nature center located in Logan Canyon, Utah. Each camp was weeklong and ran from 9:00 am-3:00 pm daily. The Stokes Nature Center camp included an overnight camp-out on Thursday. The camps were geared towards youth grades 4-6, and capacity was 15 youth per camp. The Swaner camp had eight youth participants and charged $170 per camper, and the Stokes camp had six participants and charged $190 per camper.

Curriculum

The camp curriculum was developed in the spring of 2013 with three main goals:

- Help youth develop an understanding of sustainability concepts;
- Help youth develop a respect for our natural environment;
- Teach youth about actions they can implement each and every day to lessen their impact on our

environment and conserves resources.

Each day of the weeklong camp focused on one sustainability theme—land, air, food, water, and energy—and the curriculum for each day was designed with specific topic-based objectives. The themes, objectives, and a brief description of activities for each day are provided in Table 1.

Table 1.

Sustainability Camp Daily Themes, Objectives, and Activities

Day 1: Land	
Objectives: • Differentiate between trash, recycling, and compost • Discuss the value of preserved open space • List essential resources provided by natural land • Create a vermicompost bin	**Activities:** • Journaling. Campers answered daily journal questions when they arrived. The journaling activity is described in more detail in the Evaluation section. • Campers participated in a geocache to learn about the value of open space. They used hand-held GPS units to find treasure boxes hidden throughout the open space surrounding the centers. Each box contained the answer to a question the campers had on why open space was important. A variation to this would be to design a nature-based scavenger hunt. • Lunch waste. Campers measured the amount of trash, recyclables, and compostable material generated from their lunches. This activity is described in more detail in the Evaluation section. • Camp leaders led a discussion on garbage and landfills, recycling, and compost. The discussion was accompanied by images of landfills and examples of second-life/recycled products. • Campers created their own vermicompost bin to take home. • Journaling – Campers answered the same questions from the beginning of the day in their journals. This activity is described in more detail in the Evaluation section.
Day 2: Air	
Objectives: • Identify at least three sources of air pollution • Discuss ways to improve	**Activities:** • Journaling. • Campers participated in an activity that demonstrated the causes and results of an inversion – one factor contributing to the poor air quality experienced in various areas of Utah.

air quality • List alternatives to single-passenger commuting • Describe the basic process behind climate change	Campers went on a bike ride around the neighborhood to look for sources of pollution. The bike ride was also designed to encourage biking as an alternate form of transportation to single-passenger commuting. • Lunch waste activity. • Several experiments were conducted by campers that demonstrated the basic concepts of the greenhouse effect, global climate change, and consequences of global climate change. • Journaling
Day 3: Food	
Objectives: • Define "local food" and the benefits of shopping local • Learn about product packaging • Tour a local farm and learn from a local producer • Build an herb garden to take home	**Activities:** • Journaling • Camp leaders led a discussion on local food, and campers conducted an activity on food miles, in which groups of campers were given several food items and mapped out where those items originated from on a world map. • Campers participated in a packaging activity in which groups of campers were given various food items and were asked to look at and discuss the packaging in which those items came. Each group then presented on which food item they would choose in order to avoid discarding the most packaging material. • Lunch waste activity. • Campers toured a local, organic farm that provides community supported agriculture (CSA) products to the community. The farm was close enough to the location of the Swaner camp session that campers were able to bike to the farm instead of driving. • Campers built a small garden box to take home and planted lettuce seeds in the box. • Journaling.
Day 4: Energy	
Objectives: • Define renewable	**Activities:** • Journaling. • Employees of a local renewable energy source company

and non-renewable energy • List different sources of energy and their pros and cons • Investigate solar and wind energy	were guest presenters and led a discussion with campers on different sources of energy and the pros and cons of each source. • Campers baked brownies in a solar oven. • Lunch waste activity. • Campers built solar-powered cars using purchased kits. • Campers designed and built wind turbines and tested their designs for electrical output using the 2011 4-H National Youth Science Day science experiment Wired for Wind (National 4-H, 2013). • Journaling.
Day 5: Water	
Objectives: • List at least three ways to conserve water • Describe what happens to water in our houses after we use it • Learn about stream ecology and the importance of water in the environment	**Activities:** • Journaling. • Campers participated in activities that taught about the water cycle, the importance of water, and the importance of conserving water. • Campers toured a wastewater treatment plant where they learned about what happens to the water we use in our houses after we use it. • Lunch waste activity. • Campers explored a local stream by testing water quality and collecting and identifying aquatic macroinvertebrates • Ice cream party for lunch waste reduction activity (described in more detail in Evaluation section). • Journaling. • Parent Open House - On the last day of camp, a parent open house was held in an effort to engage the parents in the topics their children learned throughout the week. The open house included a brief presentation by the Extension Sustainability Specialist on the various topics discussed during camp, a brief picture slideshow of the week at camp, and a presentation of certificates and t-shirts to each camper. Parents were sent home with a packet of information regarding camp topics, including Utah State University Extension fact sheets for each topic addressed during camp. The parents were also given a customer satisfaction survey to evaluate their

	level of satisfaction with the camp structure, curriculum, and logistics.

Evaluation

The Sustainability Camp was evaluated in three ways: journaling, lunch waste-reduction activity, and retrospective household follow-up.

Journaling

Each day, when campers arrived at camp, a series of questions were written on a board in the front of the classroom. These questions were developed in order to evaluate campers' changes in knowledge and attitudes regarding the sustainability topics covered each day of camp. Campers answered the questions each morning in journals provided to them. There was no discussion of the journal questions or their answers at the beginning of the day. Campers were simply told to answer the questions as best they could, and to put "I don't know" if they did not know the answer to a question. At the end of each day, campers answered the same questions in their journals. Some of the questions asked campers to draw their answer. Drawing questions were included in order to provide diversity for the campers in journaling activities and in order to provide a second evaluation medium by which to evaluate changes. Questions asked each day are listed in Table 2.

Table 2.

Journal Questions Asked of Campers Each Day

Land • Why is land/open space important? • If you put something in the trashcan what happens to it? • If you put something in a recycle bin what happens to it? • If you put something in a compost bin what happens to it? • What can you do to reduce waste?
Air • Why is clean air important? • What pollutes our air? • How can you help improve the air you breathe? • Draw a city with no air pollution, and nothing in the city that creates air pollution.
Food • What is local food? • Why buy local food? • What is a food mile? • Draw a picture of where the food in your lunch comes from.

Energy • What is renewable energy? • What is non-renewable energy? • Why is energy important? • Draw as many sources of energy as you can.
Water • Why is water important? • Where does water go when you flush it down the toilet? • What can you do to conserve water? • Draw what water means to you.

Camp developers tracked changes in awareness by analyzing all of the journal questions. All of the answers/pictures were classified in one of three ways: the answer/picture showed an increase in knowledge of the topic or an improved attitude towards the importance of the topic, the answer/picture showed no change in knowledge or attitude, or the answer/picture showed a decrease in knowledge or attitude. Examples of answers that showed increased knowledge/attitude include the following.

- Question: What can you do to reduce waste?
  - Pre-camp answer: "I don't know."
  - Post-camp answer: "What you can do to reduce waste, you can bring less plastic and less trash and less compost."
- Question: Why is open space important?
  - Pre-camp answer: "For bugs to survive."
  - Post-camp answer: "East Canyon [Creek] is our water source and filters water."

An example of an answer that showed a decrease in knowledge/attitude is the following.

- Question: What is non-renewable energy?
  - Pre-camp answer: "I don't know."
  - Post-camp answer: "No energy."

Examples of answers that showed no change in knowledge/attitude include the following.

- Question: If you put something in a recycle bin, what happens to it?

- Pre-camp answer: "It becomes something else."
- Post-camp answer: "If you put something in a recycle bin it becomes something else."

- Question: What is renewable energy?
  - Pre-camp answer: "It is energy that you can use again."
  - Post-camp answer: "Same."

The percent of campers that showed an increase, decrease, or no change in knowledge or attitude was calculated for each question. In addition, the percent of campers who demonstrated a prior understanding of the topic was calculated for each question. This designation allowed establishment of whether or not campers had pre-existing understanding of the topics taught during camp and if the camp provided campers with new information or simply reiterated information they already knew. Examples of answers that showed a camper had a pre-existing understanding of a topic include the following.

- Question: If you put something in the trashcan what happens to it?
  - Pre-camp answer: "The trash goes to the landfill."
- Question: How can you help improve the air you breathe?
  - Pre-camp answer: "Carpool and take the bus."

Lunch Waste-Reduction Activity

After lunch each day of camp, campers weighed (in grams) the trash, recyclables, and compostable material generated from their lunches. All measurements were added for each category to create an overall amount of trash, recyclables, and compostable material for the camp each day. Campers were told on the first day of camp that if they could reduce the trash and recyclables generated by their lunches by half by the last day of camp they would receive an ice cream party. Even though compostable material was measured, it was not used in the evaluation as campers put their compost items in the vermicompost bins they created at camp.

Post-Camp Parent Survey

The parents of each camper were emailed an electronic survey 6 weeks after the camp ended. This survey was designed to evaluate the effectiveness of the camp at influencing knowledge and behavior in the campers' homes and families after the camp ended. Parents were informed of the survey during the Parent Open House on the last day of camp. The sample size for the parent survey was seven responses, three responses from camper families that attended the Stokes session and four responses from camper families that attended the Swaner session. Specific questions asked in the parent survey

are given in the Results section. In general, parents were asked to rate their level of agreement (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree) with a series of statements that asked if they had adopted any new sustainability practices in their household as a result of the camp. The average rating for each question was calculated. In addition, parents were asked to rate their level of confidence (1 = not confident at all, 2 = slightly confident, 3 = neutral, 4 = confident, 5 = very confident) at performing a series of sustainability practices. They were asked to rate their level of confidence both before and after their child attended camp. The average pre- and post-camp ratings were calculated for each question, and a paired-sample T-test was conducted on the pre and post-camp ratings for each question to determine if there was a significant difference between confidence ratings before and after participation in the camp.

Results

Journaling

This section shows results from the daily camp journaling activities. Campers completed a set of guided questions at the beginning of each day and revisited the same questions towards the end of the day. Figure 1 demonstrates the percent of camper journal answers that showed increased, decreased, or no change in knowledge/attitudes for each question. Values are also shown for the percent of campers who demonstrated a previous understanding of the topic covered in each question. A percentage of previous understanding was not calculated for the last question ("Draw what water means to you.") because this was an opinion question. The first five questions (with topics ranging from land/open space to reducing waste) have a sample size of 13, while the remaining 16 questions have a sample size of 14.

Figure 1a.

Awareness Change via Journaling Activity

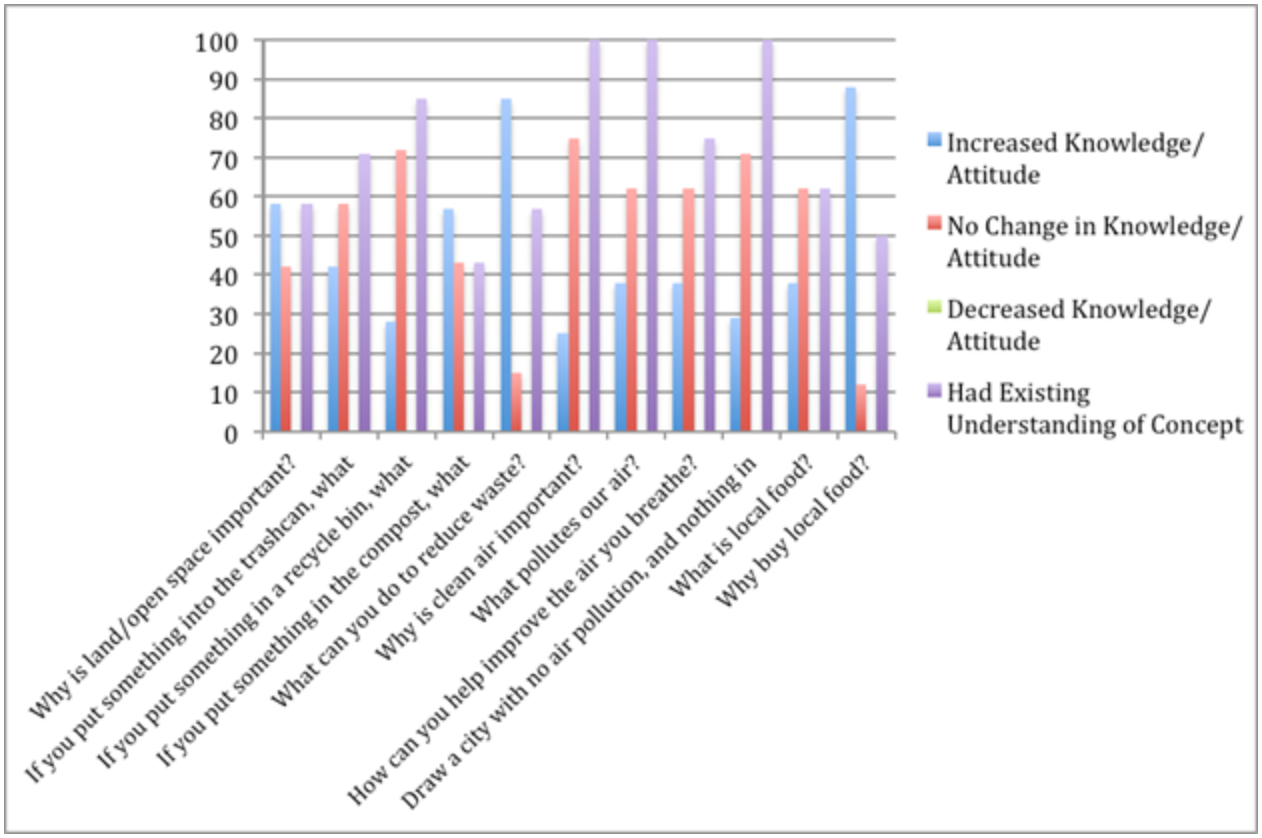
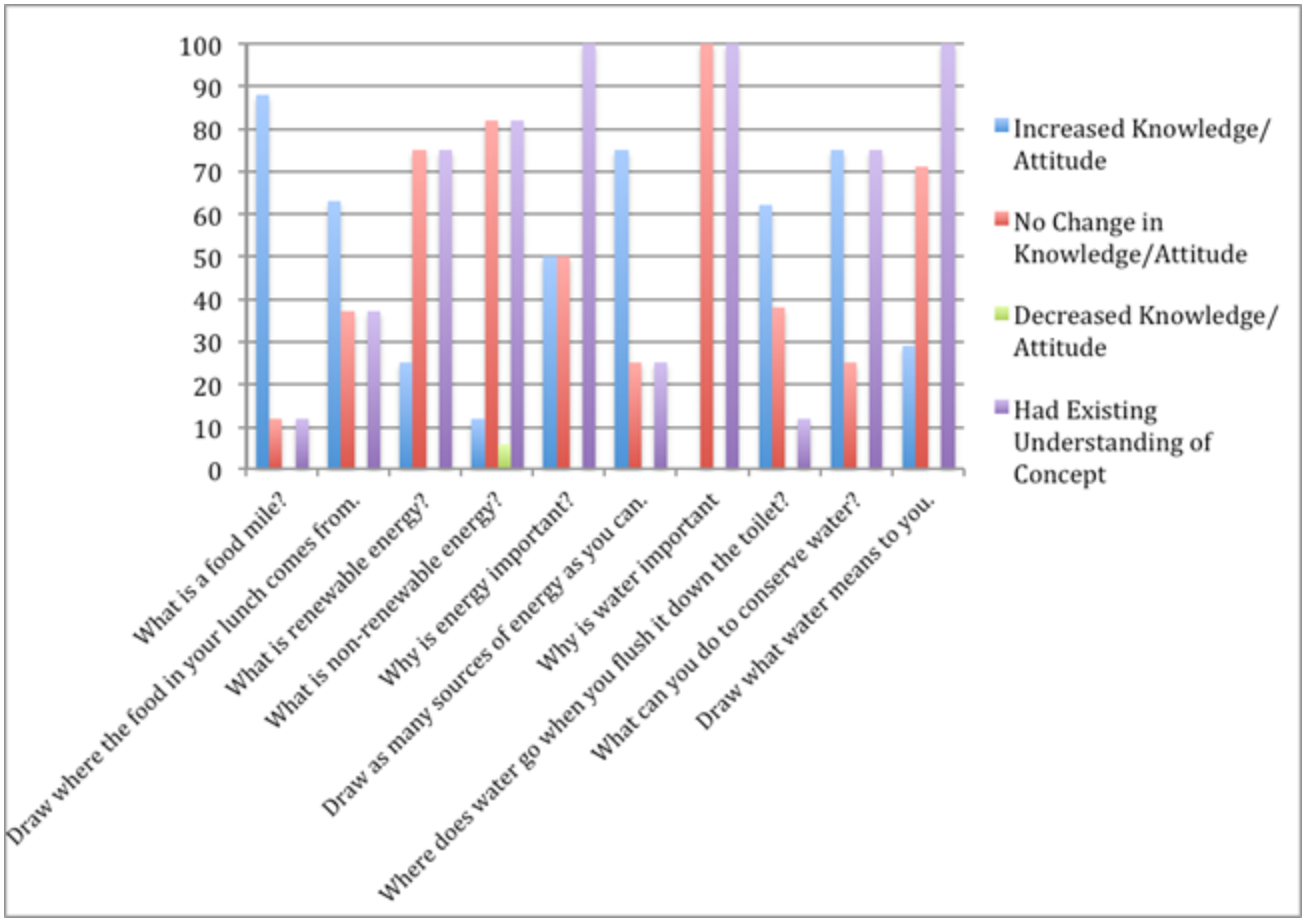


Figure 1b.

Awareness Change via Journaling Activity (Cont.)



Questions with the largest number of campers demonstrating increases in knowledge/attitude, where over 50% of campers showed improvement, included:

- Why is land/open space important?
- If you put something in the compost, what happens to it?
- What can you do to reduce waste?
- Why buy local food?
- What is a food mile?
- Draw a picture of where the food in your lunch comes from.
- Draw as many sources of energy as you can.
- Where does water go when you flush it down the toilet?
- What can you do to conserve water?

Change was also documented via pre and post pictures drawn by campers. Figure 2 demonstrates an example of a pre-camp journal drawing completed by a camper for the question "Draw a picture of where the food in your lunch comes from." In this initial drawing, the camper relayed "junk" food from Costco. Figure 3 shows a drawing from the same camper at the end of the day, in response to the same question. This time, healthy food and a farm are depicted.

Figure 2.

Initial Drawing of Where a Camper's Lunch Comes From

Figure 3.
Post Drawing of Where a Camper's Lunch Comes From

Lunch Waste-Reduction Activity

Both camps saw a significant decrease in lunch waste. Table 3 provides an example of lunch waste reduction from the Swaner camp data. Daily weights for the trash, recyclables, and compostable material generated from campers' lunches are shown. Weights were combined for all campers (n = 7 on Monday, n = 8 for Tuesday-Friday) for each category, each day.

Table 3.
Daily Lunch Waste Generated

Day	Trash Weight (g)	Recyclables Weight (g)	Compostable Materials Weight (g)
Monday	70.8	82.0	281.9

Tuesday	74.6	20.3	92.9
Wednesday	7.1	5.1	33.6
Thursday	2.6	0	30.4
Friday	5.7	4.9	33.5

Post-Camp Parent Survey

One month following the camp, parents were sent a retrospective post-then-pre survey to assess whether their child's participation in the camp resulted in awareness and behavioral changes at the household level. Results from this follow-up evaluation are shared in Tables 4 and 5.

Table 4 relates average confidence levels reported by parents at performing sustainability-related tasks before and after their child/children attended the Sustainability Camp. The question asked was: "Please rate your family's level of confidence at performing the following activities before and after your child's/children's participation in the Sustainability Summer Camp." (1 = not confident at all, 2 = slightly confident, 3 = neutral, 4 = confident, 5 = very confident). A total of seven responses were received (4 responses from Swaner session, 3 responses from Stokes session). Results of the paired sample t-test conducted to determine if pre- and post-camp ratings were significantly different are also given. An asterisk (*) by the p value indicates a significant difference.

Table 4.

Household Change in Confidence

Item	Mean Before Camp	Mean After Camp	*t*	*p*
Describing what "sustainability" means	3.13	4.50	4.25	0.004*
Defining "local food"	3.25	4.75	3.00	0.020*
Differentiating between non-renewable & renewable energy	3.25	4.13	2.20	0.065
Listing at least three different types of alternative energy	3.63	4.63	2.16	0.068
Describing what happens to water when it is flushed down the toilet	3.00	4.63	3.53	0.01*
Differentiating between trash, recycling, and compost	3.71	5.00	4.50	0.004*
Listing at least 3 major sources of air pollution	3.00	4.71	4.08	0.007*
Discussing specific actions to improve	3.14	4.57	4.80	0.003*

air quality				
Maintaining a vermicompost bin	1.86	4.14	3.55	0.012*

Table 5 lists average levels of agreement reported by parents in performing specific sustainable behaviors as a result of their child/children participating in the Sustainability Camp. The question asked was: "Please indicate your level of agreement with the following statements: As a result of my child/children's participation in the Sustainability Camp, our family…"(1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). Again, this table shows results from the seven responses received.

Table 5.

Reported Household Level of Agreement Regarding Sustainability Actions

Item	Mean	Standard Deviation
Recycles more	4.14	0.90
Looks for local products in the grocery store	3.71	0.76
Looks for less packaging when shopping for products	3.43	0.78
Actively conserves water	4.14	0.69
Composts	4.00	1.00
Uses alternative forms of transportation (such as cycling, walking, taking the bus, or carpooling) whenever possible	3.57	0.53

Discussion and Conclusions

The Sustainability Camp increased campers' knowledge and attitudes on the following topics, about all of which the campers had little to no pre-existing understanding:

- Composting
- Importance of open space
- Benefits of buying local food
- Food miles
- What happens to water in your house after you use it
- Source of our food
- Sources of energy

Water conservation

- Reducing waste

Knowledge and attitudes regarding all five topics for which the majority of campers had no pre-existing understanding before the camp increased (composting, food miles, the origins of food, energy sources, and the fate of the water we use in our houses after we use it). These results indicate that the Sustainability Camp achieved its goals of: 1) Helping youth develop an understanding of sustainability concepts; 2) Helping youth develop a respect for our natural environment; and 3) Teaching youth actions they can implement each and every day to lessen their impact on our environment and conserve resources.

The Sustainability Camp was effective at influencing campers and their families to adopt sustainable practices in their homes. Campers and their parents successfully reduced the amount of waste and recyclable items generated from lunches during camp by 92% and 94%, respectively. Parents reported that as a result of the camp their families adopted the following behaviors (agreement rating ≥4.00 "agree"-"strongly agree"):

- Families recycle more
- Families actively work to conserve water
- Families compost

In addition, parents indicated that their family's level of confidence in performing sustainability-related tasks increased for most of the topics taught during the camp. All but two topics showed statistically significant differences ($p < 0.05$) in confidence ratings before and after the camp. Confidence ratings increased from "Neutral" (3) on average to "Confident" (4) or "Very Confident (5) for the following topics:

- Defining Sustainability
- Defining local food
- Differentiating between trash, recycling, compost
- Listing sources of air pollution
- Listing ways to improve air quality
- Composting
- Describing what happens to water in our houses after we use it

Extension Sustainability Camps educating youth about local food, air quality, land conservation, landfill issues, renewable energy, and water conservation can not only result in changes of awareness and

behavior among youth and their families, but they can also help Extension remain in the forefront of outreach programs to meet public demand and need. If interested in delivering a Extension Sustainability camp in your area, contact the authors for a link to the camp curricula and for the household evaluation assessment.

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